TABLE FOR COMMENTS

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| **#** | **Para No./ Annex / Figure / Table** | | **Line Number** | **Type of comment**  **ge** = general  **te** = technical **ed** = editorial | **Comment**  **(including justification for change)** | **Proposed change**  **(including proposed text)** | **Assessment of comment**  **(*to be completed by UNFCCC secretariat*)** |
| **1** | **Section 3.2**  **Pg 4** | | **Line 11 point (a)** | **ge** | **The authors assert that CDM TOOL30 delineates biomass consumption on a jurisdictional basis, while MoFuSS employs a pixel-level scale and subsequently aggregates these values to higher levels.**  **The rationale behind the utilization of pixel-level fNRB values remains unexplained, particularly because growth, harvest, and consumption — factors employed in the fNRB estimation — may not coincide within the same pixel.** | **The authors should include a discussion concerning the relevance and applicability of pixel-scale fNRB values.** |  |
| **2** | **Proposed changes to TOOL30**  **Pg 49** | | **First paragraph** | **ge** | **CDM TOOL30 v4.0 serves as a guideline for determining fNRB, offering flexibility for the integration of various methods and techniques to accommodate specific nuances. It is an adaptable tool open to justifiable amendments.**  **For example, it is noted that the assertion that TOOL30 lacks provisions for explicit spatial analyses is inaccurate. In practice, the tool allows for survey data to be used. For instance, the CDM TOOL30-based methodology we rely on to estimate our fNRB values utilizes the latest Hansen spatial tree cover data, which is further disaggregated into ecological zones and age of stand (see Annex 2\_fNRB\_CQC\_C4ES Technical Review). This approach also includes spatial data for protected and geographically remote areas.**  **Additionally, the claim that the tool recommends using outdated 2000 FAO tree cover data that overlooks trees outside of forests that are harvested for fuelwood is incorrect. The tool, in fact, offers multiple sources for tree cover data and mandates the use of the most recent data. The FAO 2020 forest cover data represents just one option, with the flexibility to incorporate project-specific survey data and official statistics. Furthermore, the utilization of Hansen spatial tree cover data enables the consideration of trees outside traditional forest areas, such as plantations and agro-forested regions.** | **The passages describing these aspects of CDM TOOL30 require correction. An accurate depiction of the guidelines outlined by the tool and its capacity to accommodate nuances related to tree cover should be included.**  **Revised Text:**  **CDM TOOL30 mandates the use of the most recent available data, with a cutoff no earlier than the year 2000. The tool offers three primary options for sourcing tree cover data: the FAO Forest Resources Assessment, official statistics, and survey data. While the first two options lack spatial explicitness, the survey data option can include remote sensing surveys that allow for spatial analysis using tree cover data, such as the data published by Hansen. Hansen's data encompasses all tree cover regardless of land cover class, thereby including trees located outside of traditional forested areas.**  **If the authors of the CDM-MP92-A07 Information Note still perceive this as a limitation of CDM TOOL30 even after the necessary corrections have been made, it would be essential to provide a more detailed explanation of the perceived limitation, or alternatively, consider the removal of the paragraphs in question.** |  |
| **3** | **Proposed changes to TOOL30**  **Pg 49** | | **Second paragraph** | **ge** | **CDM TOOL30 v4.0 serves as a guideline for determining fNRB, offering flexibility for the integration of various methods and techniques to accommodate specific nuances. It is an adaptable tool open to justifiable amendments.**  **For example, the assertion that the tool lacks clear guidance regarding the choice of age-weighted growth rates for the IPCC's Refinement of the 2006 Guidelines for National Greenhouse Gas Inventories warrants consideration. The IPCC provides growth rates for trees both below and above 20 years of age, including those in primary forests. These age-weighted growth rates can exhibit significant differences, emphasizing the importance of selecting the appropriate growth rate.**  **However, the CDM TOOL30-based methodology we rely on to determine fNRB values employ Hansen tree cover, primary cover, and tree cover gain data to estimate the proportion of stands aged above and below 20 years and primary stands. This approach enables the use of specific growth rates corresponding to the age of the stand in question.** | **The passages describing these aspects of CDM TOOL30 require correction. An accurate depiction of the guidelines outlined by the tool and its capacity to accommodate nuances related to tree cover should be included.**  **Proposed text:**  **It is possible to estimate the proportion of trees aging above and below 20 years, as well as the proportion representing primary forest, using the Hansen tree cover dataset. By utilizing the total tree cover, primary tree cover, and tree cover gain data, one can ascertain the percentage of trees falling within the younger and older than 20-year age categories. Subsequently, the appropriate age-weighted growth rate can be applied to each respective portion of the forest stand to which it corresponds.**  **If the authors of the CDM-MP92-A07 Information Note still perceive this as a limitation of CDM TOOL30 even after the necessary corrections have been made, it would be essential to provide a more detailed explanation of the perceived limitation, or alternatively, consider the removal of the paragraphs in question.** |  |
| **4** | **Section 3.2**  **Pg 4** | **Line 11 point (c)** | **ge** | | **CDM TOOL30 v4.0 serves as a guideline for determining fNRB, offering flexibility for the integration of various methods and techniques to accommodate specific nuances. It is an adaptable tool open to justifiable amendments.**  **For instance, the claim made by the Information Note (CDM-MP92-A07) that the CDM TOOL30 solely addresses accessibility by excluding protected areas from biomass supply consideration is inaccurate. The tool indeed encompasses and provides guidelines for defining geographically remote areas, considering factors like proximity to roads and rivers. This provision is explicitly stated on page 11 of CDM TOOL30 v4.0:**  **"To define geographically remote areas, DNAs/PPs may consider proximity to roads or rivers. For example, forests/other wooded lands that are beyond the average distance travelled to collect fuelwood can be considered non-accessible. The information regarding the average travel distance may be sourced from national studies or peer-reviewed literature, or surveys in the project area. All areas accessible to either the forest industries or to individual households are considered accessible. Hence, wood extraction by the forest industries and fuelwood collection by individual households should both be taken into account when estimating 'non-accessible areas.'**  **Furthermore, the the CDM TOOL30-based methodology we rely on to determine fNRB values applies a 2.5 km distance buffer, determined from peer-reviewed literature, from all classified and unclassified roads. Additionally, the IUCN categories for protected areas are considered to exclude only areas where harvesting is explicitly prohibited.** | **The passages describing these aspects of CDM TOOL30 require correction. An accurate depiction of the guidelines outlined by the tool and its capacity to accommodate nuances related to tree cover should be included.**  **Proposed text:**  **The CDM TOOL30 assesses accessibility by excluding biomass from protected and geographically remote areas within the total forest extent. To define geographically remote areas, DNAs/PPs may consider proximity to roads or rivers. For instance, areas of forests or other wooded lands located beyond the average distance typically travelled to collect fuelwood may be classified as non-accessible. This average travel distance can be derived from national studies, peer-reviewed literature, or surveys conducted within the project area. Accessibility encompasses all areas accessible to both forest industries and individual households. Consequently, the estimation of "non-accessible areas" should consider wood extraction by forest industries and fuelwood collection by individual households.**  **If the authors of the CDM-MP92-A07 Information Note still perceive this as a limitation of CDM TOOL30 even after the necessary corrections have been made, it would be essential to provide a more detailed explanation of the perceived limitation, or alternatively, consider the removal of the paragraphs in question.** |  |
| **5** | **Entire document** | | **-** | **te** | **The MoFuSS model is a complex system requiring numerous spatial inputs, each characterized by varying resolutions, each contributing its unique level of uncertainty. Further complexity arises from the need for resolution adjustments.**  **Furthermore, understanding the potential relationships among these inputs is crucial to minimize variations in estimations. Unfortunately, the report does not include an assessment of collinearity among the input variables to determine their interdependencies.**  **Certain MoFuSS model inputs, such as population distribution and above-ground biomass (AGB), are derived from predicted data. Using estimated or projected data introduces notable disparities compared to the use of published data. The inherent uncertainties in the estimation model can lead to inaccuracies, potentially impacting fNRB estimation. In contrast, the utilization of published data helps mitigate these uncertainties.**  **Assumptions regarding input data for future estimations can introduce uncertainties. For instance, assuming that rural and urban areas change only in size and not in spatial distribution over time or that the percentages of fuelwood users remain constant over time can affect future predictions of population and consumption patterns.** | **The document should include a description of any required resolution adjustments and related assumptions.**  **Additionally, it is advisable to conduct a collinearity assessment of the input variables to ascertain potential relationships among them. This assessment can significantly aid in reducing variations in AGB, consumption, and fNRB estimates. The report should feature a dedicated section outlining the results, conclusions, and practical applications of the collinearity assessment.**  **Furthermore, for inputs derived from estimations or predictions, a process of verification is essential. Descriptions of the verification methods and the resulting accuracy of the data should be included in the report.**  **Moreover, it is important to establish justifiable assumptions regarding changes in population and consumption dynamics over time to improve the robustness of future predictions.** |  |
| **6** | **Biomass stocks**  **Pg 19** | | **Entire section** | **te** | **The 2010 above-ground biomass (AGB) maps utilized as baseline input for the fNRB calculations require a verification and validation process to establish their accuracy.**  **These 2010 AGB maps served as the foundation for estimating future AGB levels up to the year 2050 through the application of growth and harvest functions. The reliability of these future estimations is dependent on the accuracy of the baseline AGB data. Potential inaccuracies in the baseline AGB data can lead to inaccuracies in the future estimations.**  **Furthermore, the main document does not provide information about the model accuracy associated with the future AGB estimates, nor does it suggest any background reading for such details. While the researchers express their intentions to refine AGB estimations in future work, the current estimates may potentially contain inaccuracies that could have an impact on the fNRB assessments.** | **A validation and verification assessment of the 2010 baseline AGB maps sourced from WCMC should be carried out. The report should incorporate a dedicated section discussing the accuracy of these AGB maps.**  **Furthermore, it is essential to provide information on the model accuracy employed in predicting future AGB values in the report. This will enhance the transparency and reliability of the fNRB assessments.** |  |
| **7** | **Biomass growth functions**  **Pg 21** | | **Entire section** | **te** | **A growth function is applied to the 2010 AGB to estimate biomass growth from 2010 to 2050. This function relies on current AGB, maximum growth rate (rmax), and maximum woody biomass (K).**  **As previously mentioned, the inaccuracy of the 2010 AGB data has the potential to affect these calculations. Furthermore, the maximum AGB stock values used in the growth function are sourced from the 2010 WCMC maps. While a study has been conducted to provide standard deviations of the rmax and K values for different land cover classes to mitigate variation, using the maximum growth rate for corresponding land cover and ecological zones may lead to overestimations of biomass growth.**  **The source and accuracy of the growth function are not reported in the document, highlighting the need for validation and verification.**  **Additionally, a sensitivity analysis of the fNRB to the rmax and K values was conducted as part of the study, revealing high sensitivity. Consequently, uncertainties originating from these inputs can significantly impact the fNRB estimations.** | **The previously mentioned assessment for validating and verifying the AGB maps is crucial not only for the AGB but also for the accurate estimation of maximum AGB stock.**  **Moreover, utilizing total, primary, and tree cover gain data to estimate the portion of stand aged below and above 20 years and applying the corresponding growth rate values for different stand ages can enhance the accuracy of growth estimations.**  **It is imperative to conduct an assessment for validating and verifying the growth function, and the report should encompass a dedicated section addressing the accuracy of this function. This will bolster the reliability of the entire estimation process.** |  |
| **8** | **Biomass harvest and NRB in MoFuSS**  **Pg 35** | | **Entire section** | **te** | **A harvest function is employed to estimate biomass harvest from 2010 to 2050, which considers a pressure index, consumption, and wood fuel generated as by-products from deforestation.**  **However, the report lacks detailed information on how the pressure index is determined. Consequently, an understanding of the inclusion of the friction factor and related assumptions, which are calculated from distance and elevation to estimate accessibility, is missing.**  **Furthermore, the accuracy of the harvest function is not reported in the document. Therefore, the model necessitates validation and verification to ensure the reliability of its results.** | **The report should incorporate a description of the calculation of the pressure index and the friction factor, along with an explanation of the relationship between these elements. Additionally, it is crucial to provide justification for the assumptions and methods employed in determining the friction factors.**  **Furthermore, an assessment for validating and verifying the harvest function should be conducted, and the report should include a dedicated section addressing the accuracy and reliability of this function. This step will enhance the overall credibility of the model's results.** |  |
| **9** | **Quantifying consumption**  **Pg 26** | | **Entire section** | **te** | **The assumptions related to per capita wood fuel consumption can potentially result in either overestimation or underestimation. The application of the UNFCCC default value of 0.4 across the entire African region, coupled with the exclusion of commercial wood products from the analysis, neglects country-specific consumption patterns. For example, the FAO (2019) reports per capita consumption of woodfuel of 1.14 t/year in Ghana, which is considerably higher than the 0.4 t/year/per capital default value used in the MoFuSS model.**  **The CDM TOOL30-based methodology we rely on to determine fNRB values makes use of the latest country specific national per capita consumption values sourced from the FAO and include wood fuel, wood charcoal, industrial roundwood, sawn wood, veneer sheets and wood-based panels.** | **Instead of applying the default value, it is advisable to utilize the country-specific data derived from household surveys and PDDs for calculating consumption.**  **Furthermore, for each country, it is essential to ascertain the contribution of commercial wood production and the portion that is sustainably supplied before considering its removal from the analysis. This approach ensures a more accurate reflection of consumption patterns.** |  |
| **10** | **Para 16 – Page 5** | | **Entire paragraph** | **ge** | **The final fNRB numbers calculated by “the model are based on fuelwood projections that rely on two simple parameters”: the number of users and the amount per user.**  **Nonetheless, when cross-validated against other sources/datasets, it is quite clear that SSA is the only region in the world that has been experiencing increases in deforestation, i.e., accelerated rates. The FAO’s Forest Assessment Report (2020) for example indicates that forest loss in SSA has increased by more than 7 million hectares from 2010 to 2020 when compared to the losses from the previous decade. Moreover, when trends in populational growth and urbanization are considered (doubling population in Africa in the next decade, World Bank 2022), deforestation and degradation pressures become even more explicit.** | **Even though we understand the model is a result of multiple parameters and input data, we would strongly suggest that a general cross check of references regarding deforestation, population, and urbanization trends, as well as fuelwood projections in SSA be performed against the overall modelled results, since several sources indicate trends that often contradict stable or decreasing fNRB modest rates presented. Such a general cross check would go beyond the specific technical parameters we referred to in the previous documents since a broader cross check is likely to address qualitative analysis and literature review at the aggregate level.** |  |
| **11** | **Para 17 – Page 6** | | **Entire paragraph** | **te** | **Regarding the estimated current and projected demand for fuelwood, the model has basically focused only on residential woodfuel demand. It is stated that other sources of demand have not been included for several reasons, including (i) no reliable data on other activities, such as brickmaking, fish smoking and beer brewing and (ii) industrial roundwood (“renewable”) accounts for less than 10% of the overall wood harvest.**  **However, activities, such as brickmaking and tobacco curing, but also fish smoking and beer brewing represent substantial deforestation and degradation drivers in SSA and there is reliable data to estimate the deforestation impacts of several of these sources, as illustrated below (either direct data or in combination with other trends such as consumption of products per capita and populational growth):**  - Geist, HJ (1999). Global assessment of deforestation related to tobacco farming. Tobacco Control: 8:18–28.  - Ministry of Forestry and Natural Resources. (1993). Forest resources mapping and biomass assessment for Malawi. Satellitbild, Kiruna Sweden in cooperation with the Department of Forestry, Lilongwe.  - Drigo, R. (2019). Woodfuel integrated supply/demand overview mapping (WISDOM) Malawi: Analysis of Woodfuel Demand, Supply, and Harvesting Sustainability. Report to the USAID Mission in Malawi.  - Alam, S. A., & Starr, M. (2009). Deforestation and greenhouse gas emissions associated with fuelwood consumption of the brick making industry in Sudan. Science of The Total Environment, 407(2), 847–852. <https://doi.org/10.1016/j.scitotenv.2008.09.040>  - Beamish, A., & Donovan, W. (1989). Village-level brickmaking. *Village-Level Brickmaking.* <https://www.cabdirect.org/cabdirect/abstract/19896708359>  - Bossard, A. L. (2022). *Investigating the Optimization Potential of Brick Clamps in Malawi: Thermal efficiency analysis and perspectives of brickmakers*. <https://doi.org/10.3929/ethz-b-000580955>  - CLAY BRICK ASSOCIATION OF SOUTHERN AFRICA. (2017, February). *Clay Brick Production in Southern Africa | Clay Brick Association of Southern Africa*. <https://claybrick.org/clay-brick-production-southern-africa>  - Ngwira, S., & Watanabe, T. (2019). An Analysis of the Causes of Deforestation in Malawi: A Case of Mwazisi. *Land*, *8*(3), Article 3. <https://doi.org/10.3390/land8030048>  - Sampe, F., & Pakiding, D. L. (2015). Perception of Traditional Small Scale Brick-making owner on firewood usage for Brick-making process. *Procedia - Social and Behavioral Sciences*, *211*, 653–659. <https://doi.org/10.1016/j.sbspro.2015.11.095>  - Wiyo, K. A., Fiwa, L., & Mwase, W. (2015). Solving deforestation, protecting and managing key water catchments in Malawi using smart public and private partnerships. *Journal of Sustainable Development*, *8*(8), 251–261.  - Bockaire et al. 2020 - Air Pollution and Climate Forcing of the Charcoal Industry in Africa. Alfred S. Bockarie, loise A. Marais,\* and A. R. MacKenzie. In: Environ. Sci. Technol. 2020, 54, 13429−13438 | **The report should consider and estimate the impact of other sources of deforestation and degradation, since they are likely to have a substantive impact on deforestation. Estimations may be conservative, but ignoring these major deforestation and degradation drivers in Africa would bring about major inaccuracies leading to a level of conservatism that would be excessive and far from reality.** |  |